

SALICRUP (P. J.)

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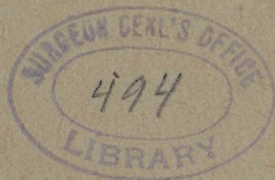
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Ex-Member of the Royal Sublegation of the Board of
Health of Puerto Rico.

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SMALL-POX

AND THE VALUE OF VACCINATION AS A PREVENTIVE.*

BY PEDRO JOSÉ SALICRUP, M. D.,

EX-MEMBER OF THE ROYAL SUBLEGATION OF THE BOARD OF HEALTH
OF PUERTO RICO.

THE disease which constitutes the subject of my paper this evening has lost a great deal of its importance in this country by the persistent and careful practice of vaccination, made compulsory by law.

In spite of this, however, the disease makes its occasional appearance among the inhabitants of the crowded tenement-house districts, generally imported by emigrants from other countries. But the cases that occur are, as a rule, of the modified or mild variety of the disorder. In this city, as in many others in this country and in Europe, where they possess a well-organized board of health with ample means for the isolation of cases and disinfection, the epidemics are checked at the outset by the prompt and efficient measures adopted by the said boards. This is not, however, the case in many other countries where vaccination is not so generally and carefully practiced, sanitary

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measures are not properly enforced, and means of isolation and disinfection are deficient or altogether wanting, where the disease continues to be a dreadful scourge, carrying away many victims and leaving many others more or less injured and marked for life with its periodical ravages.

This is especially the case in tropical countries where people belonging to colored races are abundant, for whom this disease seems to have an especial predilection, and who are generally very careless about cleanliness and sanitary measures and much prejudiced against vaccination.

In one of these countries (Puerto Rico) I have practiced medicine for twenty-two years; there I made my first acquaintance with the disease, in the treatment of which I have had a rather extensive experience. I have also in my capacity of public vaccinator, which office I held there for many years, practiced vaccination extensively by direct inoculation with bovine and humanized vaccine virus, and from arm to arm, and can testify to the beneficial effects of this operation in the shortening of epidemics and rendering subsequent ones less severe, especially since the facilities for obtaining pure and reliable vaccine virus have been increased by the foundation of an institute for the cultivation of bovine vaccine virus to supply the country.

I am sorry, Mr. President, not to be able to produce some statistics which would prove my assertion and make this paper interesting, but I could not procure them in the short time at my disposal to prepare this paper.

I do not pretend to bring to your notice in this paper any new facts in connection with the disease, but simply to call your attention to the severity which its epidemics still have in many countries, especially the West Indies, and to make a plea to bacteriologists and workers in the field of infectious diseases in favor of research and investigation of

the causes and pathogenesis of this disease, which has been little attended to, with the object of finding, if possible, a more efficient measure to prevent its occurrence, either by devising other means of producing immunity from it or devising new means of treatment in man, or by improving the present measure of preventive inoculation, "vaccination," having more extensive and precise knowledge of the germ which causes it, and its habits and peculiarities, as is the case in other diseases of the kind.

The history of small-pox dates from very far back. It is said to have existed as a scourge in China and Hindostan one thousand years before the birth of Christ, and to have made its way through Arabia and Egypt into Europe, where it was introduced by the crusaders. It was unknown on this continent before the arrival of the European conquerors and new settlers, who imported it into this and other newly discovered lands. It was a much-dreaded scourge all over the world until the wonderful discovery of Jenner in 1796 came to deprive it of a great deal of its horrible and deadly character in countries where this operation is regularly and persistently practiced. The discovery of Jenner was met by a great opposition at the beginning among a number of practitioners and lay people, and even at the present time organized anti-vaccination societies are in existence in England and other countries to attest what prejudice and ignorance can do even with the most useful and successful discoveries in our art.

I will not tire you by giving a minute and elaborate description of the disease, its clinical history, etc. I will simply make a hurried sketch of the disorder, its varieties, and different stages, making some remarks on its complications, sequelæ, and treatment, with reference to my experience with it in the different epidemics which I have observed in Puerto Rico.

Small-pox or variola is a contagious and infectious disease of the blood, characterized by a peculiar eruption of the skin and inflammation of the mucous membranes of the body, accompanied by fever.

According to the present views, like all other infectious diseases, it ought to be caused by the introduction into the body of some kind of microbe or germ which, by its presence in the blood, produces the poison, toxalbumin or toxine, which gives rise to the grave symptoms and general dyscrasia of the blood sometimes observed. But so far bacteriologists have not found any special germ, and only the common pus coccus has been found in the pustules.

The first cases of variola that appear in a locality can always be traced to contagion if properly investigated, and the disease has always a tendency to spread as an epidemic if not promptly checked by appropriate means.

It is often preceded by other exanthemata, especially measles, and whether there is any relation between the agents causing these diseases or whether it is owing merely to the epoch of the year at which they occur being favorable for their development in the human system, I am not prepared to say. As to its primitive origin, some authorities believe that it first originated in the horse and cattle and from thence was acquired by man, and others hold the opposite view. Variola is most conveniently divided, in regard to its severity, into *benignant*, *malignant*, and *modified*; as regards distribution of the eruption, into *discrete*, *semi-confluent*, *confluent*, and *corymbose* or clustered.

The course of the disease is generally divided into five periods or stages, which indicate the different phases which the disease assumes before its termination, as follows: *Incubation*, *invasion* or *primary fever*, *eruption*, *secondary* or *suppurative fever*, and *incrustation* and *decrustation* or *desquamation*.

In the modified variety all these stages are not perfectly developed, and so we will take a typical case of true variola for our description. The period of *incubation* includes the space of time which intervenes between exposure to the affection or contagion and *invasion* of the disease. This period may be shorter or longer according to the severity of the case to follow, but the limit generally assigned to it by most authorities is from five to twenty days. There are no appreciable symptoms in this stage.

The period of *invasion*, or primary fever, is marked by symptoms which indicate serious constitutional disturbance. It commences with lassitude, chills, pains of the head, loins, and limbs, and hot skin. Conjunctivæ suffused; rapid pulse and respiration. There are thirst and loss of appetite, with a white and coated tongue, dotted with red papillæ, nausea, and often vomiting, constipation, pain and heat in the epigastrium, restlessness, and general prostration. To this may follow oppression of breathing, cough, lethargy, and in some cases delirium and coma. The tongue, which at the beginning of this stage was white, becomes red, the change beginning at the point and extending subsequently over its whole surface. In children convulsions frequently occur. There is an exacerbation of febrile symptoms toward night. These symptoms vary in intensity in different cases according to the confluence or discreteness of the ensuing case, being more severe in the confluent and malignant types, especially vomiting. The disease may, and sometimes does, terminate in death in malignant cases in this period.

The symptoms of invasion generally last forty-eight hours in ordinary cases of discrete and semi-confluent eruption, and only twenty-four in confluent and malignant cases, in which the eruption appears on the second day. The symptoms of this period may be complicated with violent

and often fatal inflammation of the brain or internal organs, and in the malignant type the dyscrasia of the blood is such that the patient may die before the eruptive stage begins.

These symptoms very much resemble those of a severe cold or those of invasion of other infectious diseases, especially yellow fever, and it is very important to be able to make early a differential diagnosis to relieve anxiety and for other purposes, especially when the patient happens to be a foreigner, as they entertain a peculiar dread for yellow fever, which proves most fatal among them, while variola is more fatal to individuals of color races. Although a differential diagnosis is not always possible in these cases, the early presence of vomiting and the peculiar appearance of the tongue may help in the diagnosis of small-pox, as other symptoms are common to both.

To the period of invasion the period of eruption follows. With the outburst of the eruption all the febrile and other symptoms suddenly and immediately disappear, and the patient feels comparatively comfortable. The eruption generally begins to appear on the forehead and lips, and extends gradually to the rest of the face, neck, arms, trunk, and inferior extremity, and the same order is followed in all its stages of development. It first develops as red spots (*maculæ*), which soon become prominent, giving a hard feeling to the touch (*papulæ*). In the discrete variety they are scattered over the body and are distinct in character. In the coherent variety they resemble the patches of rubeola by their appearance in patches, and in the confluent variety they are close together and so numerous as to diffuse a hardness over the surface. These papules by the second day of eruption (fourth of invasion) become raised in small conical pimples with an inflamed base and transparent vesicular point. They continue to increase to

the fifth day of eruption and gradually pass from a conical to a flattened and umbilicated form. This form is often apparent in the vesicles from the third day. Their contents, from being transparent, become opaque and milky, and by the sixth day are converted into pus (pustules), and by the eighth day suppuration is well established. The fever, which had disappeared with the outburst of the eruption, reappears; considerable pain and redness of the skin and great tumefaction and a distressing sensation of tension of the integument occur. The eyelids are swollen and œdematous, completely burying the eyes, and the nose and lips are enormously swollen in some cases.

While these changes are taking place in the skin similar changes occur in the numerous membranes; the mucous membrane of the mouth and respiratory passages is greatly inflamed, as shown by the presence of oppression of respiration, cough, and sore throat. The alimentary canal sympathizes with the general irritation, as shown by the accompanying diarrhœa. The conjunctivæ participate in the inflammation, and in this locality, as in the air passages, pustules form, which, if not properly attended to, cause ulceration and subsequent opacity of the cornea, or staphyloma, with partial or total loss of sight.

In some very malignant forms of this disease and in cachectic individuals hæmorrhages occur in the vesicles and pustules, constituting what is known as hæmorrhagic variola, or *variola nigra*; and in other cases still severer and always fatal, the eruption does not develop in its different stages, but subcutaneous hæmorrhages take place, giving origin to ecchymoses or petechiæ, which are accompanied by other severe symptoms of decomposition and loss of plasticity of the blood, which is deficient in fibrin.

In other cases an arrest of development of the vesicles and pustules occurs with absorption of their purulent con-

tents, which results in death. The period of suppuration is accompanied in mild cases by moderate delirium, but in semiconfluent and confluent cases the symptoms assume a low typhoid type; there are restlessness, a hard cough, and hæmoptysis, and in some cases hæmaturia, accompanied by other dangerous symptoms.

This period, I have observed, can be materially shortened and its symptoms made less severe in ordinary cases by the practice of opening or cutting the pustules and expression of their contents when they are ripe.

Desiccation ordinarily begins from the eighth to the ninth day, and is indicated by the subsidence of the tumefaction of the skin and drying up of the pus and purulent discharges produced during the preceding period. It begins at the face, and crusts are often present in this region before pustules are fully matured in the trunk and extremities. This stage is sometimes prolonged, especially in the lower part of the trunk, where pressure has been exerted by lying where clusters continue to suppurate for a long time, and in places where the skin is thick, as on the palms of the hands and soles of the feet.

Decrustation or desquamation commences generally from the eleventh to the fourteenth day of eruption, and the skin below is of a deep-red color, retaining this hue for some weeks, and the newly formed epidermis is thrown off by repeated desquamation.

The cicatrices become deeper as the swelling disappears. In the confluent variety the crust remains adherent to the face for ten or twelve days, and in places where the skin is harder, as in the palms of the hands and soles of the feet, where pustules do not develop well, the whole thick epidermis is cast off in a piece, leaving the newly formed epidermis very delicate and tender, preventing the patient from walking for a long time in some cases.

The process of desiccation is accompanied with severe itching which induces the patient to scratch, often tearing the surface with his nails and causing hæmorrhages in the ulcerated surfaces and blackening of the pustules. It is also accompanied by a nauseating and offensive odor, unbearable if proper means of disinfection have not been applied from the beginning of treatment.

Some changes have been observed in the urinary secretion in relation with the various stages of the disease as to its amount, existence in it of albumin, or excess of its normal constituents.

During an epidemic some cases occur in which the symptoms of the stage of invasion make their appearance with great intensity, and the disease abates with the remission of the febrile symptoms, no eruption appearing on the skin or mucous membrane. These cases are known as *variola sine variolis*.

Many complications may occur in cases of small-pox which may cause to prove fatal a case which appeared to be progressing satisfactorily, and they may occur at any of the five stages already described, and may have for their seat the blood, nervous system, the mucous or serous membranes, the eyeballs, tongue, and cellular tissues. The stage of invasion may be very severe, the fever may run very high, the pain in the head, chest, and loins may be so severe that it may lead to the suspicion of inflammation of the organs situated in those regions, and delirium, convulsions, and coma may occur, giving a dangerous and perhaps fatal character to the case, as has been already said.

During the period of eruption serious congestion of the internal organs may ensue, and grave symptoms from the brain, spinal cord, and the lungs in the shape of convulsions, bronchitis, pneumonia, and pleurisy. The mucous membrane of the alimentary canal may be inflamed and

thus give rise to diarrhœa, dysentery, or hæmorrhage of the bowels, and many other complications may occur to which reference has already been made.

As sequelæ of small-pox many secondary affections may be developed, especially in cachectic individuals, as a consequence of variolous inflammation. Such are chronic inflammation of the various mucous membranes, producing otitis, deafness, ophthalmia, opacity of the cornea, staphyloma, ulceration of the cornea, œdema of the glottis, hæmoptysis, pulmonary tubercle, chronic bronchitis, pneumonia, pleurisy and empyema, chronic diarrhœa and glandular enlargements, caries of the bones of the face, subcutaneous abscesses, furuncles, erysipelas, gangrene of the skin and genitals, diseases of the joints, menorrhagia, hæmaturia, abscess of the kidney, miscarriage, and many others.

I must remark, however, that I have met in practice with some few persons who previous to the attack of the disease had enjoyed poor health, constantly suffering from skin diseases, asthma, and other infirmities, who after a severe attack of confluent small-pox have got rid of their troubles and enjoyed very robust health. In these cases the disease seems to have had a purifying effect on the blood of those individuals (but yet I would not advise any person suffering from those infirmities to expose himself to the contagion of variola).

I will not occupy your valuable time by speaking of the diagnosis and pathology of the affection, for the latter varies according to the complication that causes death, and does not generally throw any light on the point we want to discuss, and will therefore only mention the treatment which has been suggested in the different stages of this disease, and the plan which I adopted in regular cases, with the variations which the symptoms required.

Various ectrotic methods have been suggested and employed at different times to arrest the development of the eruption and avoid subsequent pitting. The most adopted have been cauterization of the vesicles after removing their apex with a stick of nitrate of silver (this is impracticable in semi-confluent and confluent varieties, and is dangerous and painful). Another is the application of sulphur ointment to the entire surface of the skin; another the application of a mercurial ointment also to the surface. Others consist in covering the face, or part of the whole surface of the body, with some impermeable material, as gold or silver leaf, tissue paper, different plasters, or, better, with collodion, so as to prevent the access of air.

I never used any of these methods, because many are impracticable and painful and all dangerous, as the arrest of the development of the eruption proves in most cases fatal. As to internal medicines, many have been used to meet the different symptoms as they appear, but I know of no special drug that has had any constant good results. In the uncomplicated and benign form of the disease no special treatment is necessary but the attention to the general rules of cleanliness, ventilation, and general hygiene. In complicated, confluent, and malignant ones every indication should be promptly met with the proper means, and great care has to be exerted as to cleanliness and therapeutical treatment.

I will mention the simple plan which I adopted in the majority of cases which seemed to prove successful in most of them, even in many that were expected to prove fatal when I was first called to attend the patients.

If I saw the patient at the very start of the stage of invasion, I used to prescribe a dose of calomel (proportionate to the age and sex of the patient), followed four or five hours after by a saline purgative or a dose of castor oil;

after the effects of the purge had passed I almost always observed a relief in the congestive symptoms, and ordered the patient to be sponged all over the body with a tepid weak solution of carbolic acid (two per cent.) the moment the first symptoms of the eruption began to show themselves. As an internal medication I prescribed a mixture containing carbonate of ammonium, chlorate of potassium, and saline mixture to take all along. When the swelling of the skin began I used to prescribe the external application over the whole surface of glycerin with essential oil of peppermint, which is, like other aromatic plants, a powerful disinfectant and germicide, in the proportion of two or three drops to the ounce. This I always found to greatly subdue the swelling, and seemed, in conjunction with the rest of the treatment, to exert a modifying influence in the development of the eruption. When the pustules were fully ripe I advised them to be cut with scissors, and, after pressing well their contents and washing with a weak solution of carbolic acid and hyposulphite of sodium, smear the whole surface with the glycerin and peppermint-oil mixture.

In nearly all cases that I could fairly treat with this plan the disease proved more manageable than in others; no bad odor ever originated from the patients, and they all recovered in shorter time and with less pitting than in those I was called to attend when the eruption was more or less developed.

Besides these therapeutical means, attention was directed to hygienic measures and appropriate feeding.

The room was as well ventilated as possible, kept rather dark, and all disturbing influences made to disappear as much as possible.

Some of the symptoms that accompany the stage of invasion may assume such a severe character as to require special medical treatment. The pains in the head and limbs

and especially in the loins (which is considered as a pathognomonic symptom, and I have noticed that its severity is proportionate to the severity of the attack) may be so severe that the patient yells out for relief, and external revulsion and injections of morphine have to be used to relieve them. When the eruption is tardy in its appearance the symptoms are very much intensified and the mucous membranes much congested, and measures have to be adopted in the shape of diaphoretics and warm bath and revulsives, which last promptly act in bringing it out.

Wherever a mustard plaster or blister is applied the eruption promptly appears in a confluent form, and one of the best means to limit it is the application of a number of blisters to the limbs and trunk, as the eruption in these cases does not appear anywhere but in the place of the blisters.

This method works well in some cases; but sometimes it is very difficult to heal these blisters, which continue to suppurate for a long time, and even gangrene of the skin supervenes in them and deep and extensive cicatrices follow.

When typhoid symptoms appear in the suppurative stage stimulants of all kinds have to be freely used, carbonate of ammonium, cinchona, and alcohol being the most useful, and every complication has to be met with the appropriate therapeutical means.

Cases of the disease among intelligent and well-to-do people are more successfully treated than among the poor, as with the former ample means of ventilation, seclusion, and other sanitary surroundings are easily adopted, while among the latter these means are very deficient or totally lacking. I have attended cases of both kinds, but it has been my lot to attend during several epidemics hundreds of cases among the poorer and most ignorant classes, especially of the colored class, in which great prejudice existed against all therapeutical measures, and absolute absence of all sani-

tary surroundings and material means of every kind. I had to contend with all these drawbacks and to do the best I could with the scarce means at my disposal.

Small-pox has become endemic in Puerto Rico and is raging probably all the year in one or another of the twenty-eight towns which form the island.

Epidemics have a very severe character, and every year hundreds of victims are carried away by this disease. Nearly forty per cent. of the inhabitants bear marks of having had the disease in a more or less severe form, and many suffer from partial or total blindness and other sequelæ of it, especially among the colored part of the population.

Sanitary measures are very imperfectly carried on there, and when an epidemic attacks a city or town and after it has made considerable progress, temporary hospitals are built which are really more centers of infection than anything else, as they lack every facility for the proper treatment which a hospital should have.

Only poor patients are compelled to go to such hospitals, and you often find severe cases in the most pitiful condition of abandonment and filth in the very center of a town where well-to do people inhabit, and on the ground floor of their houses, in a small room without any means of ventilation, where five or six other sound persons sleep. And these constitute the majority of the cases which I have been called to treat.

Vaccination.—The efficiency of the preventive power of vaccination is proved by the facts of the almost total disappearance of the disease in countries and cities like this in which vaccination is persistently practiced in conjunction with isolation of cases at their start and other sanitary measures. But that by itself it does not afford such perfect protection from an attack of the disease as it was at first enthusiastically believed, is also proved by what happens in

countries where sanitary measures are defective and isolation of cases not opportunely practiced. Persons who have been successfully vaccinated, if exposed to contagion, are sometimes attacked by the disease in its worst form and even killed by it; but, fortunately, this is the exception, the rule being that those properly vaccinated when exposed to the contagion only suffer from the modified variety of the affection.

The protective agency of an attack of variola against subsequent invasions of the disease being known from an early period of medical history, and with the purpose of obtaining this protection, the inoculation of variola was practiced as far back as 1673 in Constantinople, and the practice introduced into England; thence it extended to the continent of Europe. But this inoculation, which generally caused a mild attack of the disease, sometimes produced serious symptoms, which often culminated in the death of the inoculated person, and it was substituted by the more innocent method of vaccination, when this discovery was made by the immortal Jenner.

Jenner was acquainted with the occurrence of a disease in the cow, called vaccinia, characterized by the appearance of pustule in the teats and udders of these animals, which very much resembled the pustule of small-pox. He observed that the men who milked and handled cows affected with the disease had a similar eruption developed in their hands and arms, and that they enjoyed a remarkable immunity to the invasion of variola. On this observation he founded his great discovery, and the first experiment with vaccination with cow-pox was made by him on the 14th of May, 1796.

I have already alluded to the opposition he met with among his contemporaries and which his method still meets with among many prejudiced persons, but the value

of the method is at present recognized by the generality, and is practiced with good success all over the civilized world.

The short space of time allowed for the reading of this paper does not allow me to give the subject of vaccine and vaccination the attention which it deserves, and I have to limit my remarks to the most essential points in connection with it, passing in silence others that I would like to make the subject of discussion this evening.

Among the many arguments that have been raised against vaccination, and one that yet stands in the minds of many, is the possibility of inoculating other constitutional diseases existing in the blood of the person who supplies the virus when the humanized one is used, and another is the possibility of causing infectious diseases of the blood by using impure or decomposed virus.

To the first it may be answered that the small-pox pustule, although no peculiar germ has yet been discovered and described by bacteriologists, may be considered as a pure culture of the poison or germ that produces the disease, and, if only its contents are used for inoculation, no danger exists of anything but vaccinia being inoculated. It may be and is considered by some as possessing always its peculiar characteristics, no matter what the nature of the constitution of the individual in which it grows or develops. And so far no facts have been brought to clearly prove the occurrence of the communicability through vaccination of any other disease, provided the operation has been well performed without unnecessarily mixing the blood of the giver and recipient of the virus when the operation is performed from arm to arm.

The use of bovine virus has done away with this objection in a great measure. To the second objection, or the possibility of causing blood poisoning by the introduction

of putrid substances in the blood (which accident may often happen, and I have seen a case of such blood infection with severe symptoms of inflammation and infarction of the lymphatic system of the arm operated upon, threatening mortification and endangering life, after inoculation with bovine virus), it may be answered that, with proper care in the selection of the virus employed, trying to use fresh virus always when possible, no fear need be entertained of such accidents happening.

As to the process of development of vaccine, and the way and different methods of practicing the inoculation, I will not speak, not to keep you longer.

I will only remark as to the method of practicing the operation that it is well that every one should adhere to the process which yields him the greatest amount of success, and that I believe that the more bloodless a method the safest it is for the individual inoculated and the success of the operation.

Time does not allow me to be more extensive on this important subject; but if my remarks can bring forth a discussion on the subject by the more competent men present here and those invited for the purpose, the object of my paper will be fulfilled, and I shall not have tired you with my long paper.



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